

Variation of energy intake during lactation: Effects on dry matter intake and performance
(Wechsel der Energieversorgung in der Laktation: Auswirkungen auf Futteraufnahme und Leistung)
Susanne Rempis, H. Steingäß*, L. Gruber and H. Schenkel – Stuttgart-Hohenheim / Irndning

Energy intake and supply change throughout lactation. In the period around partus both an oversupply and a deficiency can have detrimental consequences for the animal. The incidence of metabolic diseases increases and performance declines. In the present experiment cows received different energy levels in the course of lactation. The objectives were to determine the effects of an abrupt change of energy supply in lactation on dry matter (DM) intake, milk yield and composition. There are only a few older studies where a related problem was examined.

Methods: The experiment was carried out with 81 Holstein cows in their second or later lactation. In the first two lactation trimesters (lactation week 1-15 and 16-30) cows were allocated to three different levels of energy allowance: low (L1), medium (M1), and high (H1) by variation of concentrate share and forage quality of the diets. Mean concentrations of Net Energy Lactation (NEL) in the first and second lactation trimester were 6.2; 6.6; 7.0 MJ/kg DM for L1, M1, H1, respectively. In the last lactation trimester (lactation week 31-44) the groups were subdivided into three energy levels (L2, M2, H2) to study the interactions of changing energy supply in the different lactation stages (e.g. L1L2, L1M2, ... H1M2, H1H2). Mean NEL concentration in period L2, M2, H2 was 5.8; 6.1; 6.6 MJ/kg DM.

Results: Interactions between the treatments in weeks 1-30 and 31-44 are shown in the table. Concentrate intake and DM intake depended on the concentrate level of the actual ration, and were not influenced by the concentrate intake in the first two lactation trimesters, the L1H2, M1H2, and H1H2 animals consumed more. The NEL intake also showed a tendency for higher intake with increasing energy level of the ration. For the M1 and H1 groups, daily yields of energy corrected milk (ECM) and milk (kg) depended on the concentrate level of the actual ration, and were not significantly influenced by the concentrate intake in the previous lactation trimesters. However, the L1 groups did not increase their milk yield in the last lactation trimester although NEL intake exceeded energy requirement by far. In lactation week 31-44 milk fat content of L1 groups decreased with higher concentrate level, as expected. However, in the last lactation trimester the milk fat content of the M1 and H1 groups developed not according to actual concentrate intake. Milk protein content adjusted to the actual energy supply and increased with higher concentrate level. A highly significant effect of previous energy intake on actual milk lactose content was observed.

	L1L2	L1M2	L1H2	M1L2	M1M2	M1H2	H1L2	H1M2	H1H2	RSD	P-value
CI	0.6	2.8	5.9	1.0	3.5	6.3	1.4	3.9	6.7	0.8	0.891
DMI	17.0	18.0	19.9	17.1	19.5	20.4	16.6	19.1	21.1	2.2	0.411
NELI	97.3	107.9	129.2	98.4	118.7	133.1	97.5	117.4	141.0	14.6	0.364
ECM	14.7	14.1	16.4	16.7	20.6	24.7	16.3	21.7	22.3	4.4	0.085
Milk	13.2	12.9	15.6	15.0	17.7	21.9	15.2	19.2	19.9	4.1	0.298
Fat	4.85	4.59	4.32	4.95	5.30	5.19	4.65	5.09	4.89	0.66	0.084
Protein	3.36	3.47	3.47	3.48	3.60	3.50	3.49	3.58	3.70	0.28	0.672
Lactose	4.57	4.49	4.44	4.36	4.67	4.66	4.48	4.58	4.59	0.22	0.007

CI (concentrate intake) and DMI (dry matter intake) in kg DM, NELI (net energy lactation intake) in MJ

ECM (energy corrected milk) and Milk in kg; Fat, Protein and Lactose in %

P-value for interactions between the treatments in weeks 1-30 and 31-44

Conclusions: DMI was mainly affected by the concentrate content of the diet. No effects of the diet previously fed on intake were detected when cows switched from one diet to the other during the last lactation trimester. Change of energy levels influenced milk yield and milk constituents.

*Institut für Tierernährung (450), Universität Hohenheim, 70593 Stuttgart